

FOR THE DESIGN, CONSTRUCTION AND ENJOYMENT OF UNUSUAL SOUND SOURCES

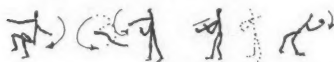
EXPERIMENTAL MUSICAL INSTRUMENTS

HELLO, READERS



We have in this issue a study of the great non-traditional tradition of the one man band. In the article starting below right, author Hal Rammel gives us some sense of the where and when and how of one man bands past and present, and then introduces one of today's creative individualists in the tradition, Joe Barrick, maker of the piatarbajo.

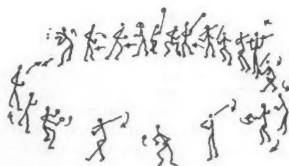
Meanwhile, the nimble stick figures scattered about this front page represent players of instruments sounded by spinning and swinging movements. They herald a series of three articles by practitioners of *swung music* that will be appearing in EMI, starting with David Toop's "Whirled Music" on page 12 of this issue.



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Drawings this page by David Toop (see p. 12 for article).



Also this time around, Hugh Davies gives us a chronicle of sound borrowing, tracing the history of the idea of musical instruments with voices captured from outside sources. You will find still more things when you open up, but for now, we turn to Joe Barrick, the Piatarbajo, and the history of the one man band.



THE PIATARBAJO ITS HISTORY AND DEVELOPMENT

By Hal Rammel

Among ensembles of invented and reinvented musical instruments none may perhaps be more unique than the orchestras played and led by a single musician. The history of the one-man band is a study in uniqueness, and among the most unusual is the **piatarbajo**, designed and built by Joe Barrick. At the hands (and feet) of Joe Barrick, the piatarbajo performs as a five-piece band, providing all the rhythmic and harmonic accompaniment needed for Barrick's lead guitar, mandolin, fiddle, harmonica or vocal. But, while the piatarbajo was built some fifteen years ago, the idea, as Joe Barrick expresses it, "to do it all," has been around much longer and has provoked a wide range of responses and solutions. Borne of this impulse to play it all, alone, have been an extraordinary variety of musical instruments performed upon by an equally diverse, inventive and determined array of musicians.

The one-man band exists, in all its uniqueness and independence, as a most elusive yet persistent musical tradition. Defined simply as

(continued on page 6)

I ENJOYED YOUR FINE SURVEY, "Mirlitons: Kazoos and Beyond." Your list of various voice mirlitons includes the bazooka, so I thought you might be interested in a bit more information on this variation. The bazooka was the invention of Bob Burns of Van Buren, Arkansas sometime in the early 1900s. He claimed to have put it together while a young mandolin player with the Van Buren Queen City Silver Cornet Band out of a piece of gas pipe and a whiskey funnel. Burns coined the name "bazooka" as imitative of the sound it produced. Burns had an active career as a musician and comedian in tent shows, carnival bands, and vaudeville until he broke into radio on the Rudy Vallee Show in 1932. He had by then developed a routine of backwoods comedy, rural monologues, and novelty songs featuring the bazooka, calling himself The Arkansas Traveller (a comedy routine and a comic theme far older than Bob Burns, however). In the mid 1930s he was featured on the Bing Crosby radio show where he crossed musical paths with the young Spike Jones. In the 40s he had his own radio show "The Arkansas Traveller" that featured Spike Jones and the City Slickers (though Burns was never a member of that band). Burns and his bazooka were popular enough in the 40s that the U.S. Army named its new anti-tank weapon after the instrument because of their similar appearance.

Jack Mirtle, in his **Thank You Music Lovers** bi-discography of Spike Jones, gives quite a full description of the Bob Burns bazooka: It was originally

a gas pipe about 3 feet long with a whiskey funnel on one end -- a very fat post-horn, or megaphone, with an extension. Music was produced by a combination of humming and vibrating one's lips into the small end (there was no mouthpiece), similar to wordless singing. Simple? Not really, as the performer still had to produce, as a singer would, the correct musical pitch. The pipe's short length, coupled with its large bore (about 2 1/2 inches in diameter), rendered it acoustically impossible to use as an open (or closed) ended tube, and having no fundamental tone or overtones (harmonic series), its range was limited to that of the soloist's voice. A tenor trombone played

with a loose embouchure will give a good facsimile of the sound Burns produced.

Later forms of the instrument featured two telescoping tubes played trombone style.

This is decidedly not a mirliton but, rather, the simplest sort of trumpet with tailgate trombone trappings for comic effect. At some point, however, during the height of Burns' popularity on radio, the M.M. Pochapin Company of New York began manufacturing the "Bob Burns Kazooed Bazooka," a toy bazooka about a foot in length stretching to a foot and a half with a kazoo mechanism in the mouthpiece very similar to the metal kazooes available today. (An added musical feature here is the unavoidable squeaking sound as the tubes telescope back and forth; an effect lost in modern commercially made slide instruments.) So, it seems that only the toy "kazooed" bazooka was a voice mirliton.

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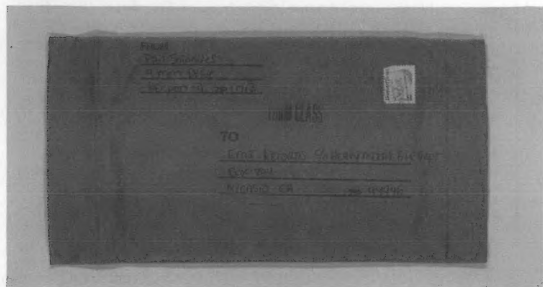
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ton, while the original Bob Burns' bazookas was, indeed, something else.

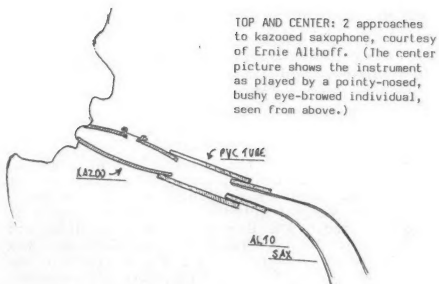
One other note: Mitford Mathew's *Americanisms: A Dictionary of Selected Americanisms on Historical Principles* reports this earliest appearance of the word "kazoo" in the *Lisbon Dakota Star* in 1884: "When you hear a noise like the combined sound of a fish-horn and a runaway ... it is only the small boy amusing himself peaceably with his kazoo."

Hal Rammel

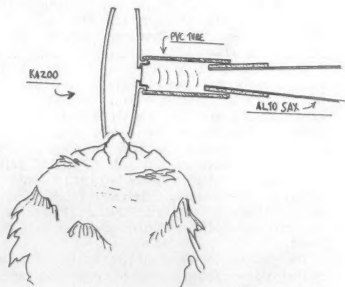
REGARDING MIRLITONS:

Some years ago I built several attachments/preparations for my alto saxophone. Early ones were extra tube loops and lengths of PVC tube (arrgh!) which dropped the pitch of the instrument down to bass and contra bass clarinet level beautifully (lovely rumbling, grumbling sounds; my friend Ron and I used to do didjeridu/prepared alto sax improv drone duets) and shot the chromatic octave to total destruction! All sorts of strange timbral things started happening with the instrument. Then I made a set of little "add-ons" at the mouthpiece end -- a little siren, a set of pitch pipes in a PVC tube, a party whistle and a KAZOO! I made two kazoo versions (see diagrams). One sent the air through the kazoo into the saxophone, and the other sent the membrane sound into the saxophone. This second version was awkward to hold and play because of the strange angles, but I could have improved it. In both cases the keys of the sax worked more as timbral modulators than as pitch controllers, but this is more to my interests anyway. I could alter the pitch by "singing" a different note. I did a fair amount of talking and speech sounds through it, and the ripples of timbral modulations as I worked the sax keys in rapid succession was a strange, almost ghostly, little overlay to the main sound. Not very loud, but certainly audible in a standard lounge-room. (Probably about normal kazoo range, actually). So, is this a prepared saxophone or a treated kazoo? Recipe: take two instruments and combine them to build a third -- this is the odd way I often work.

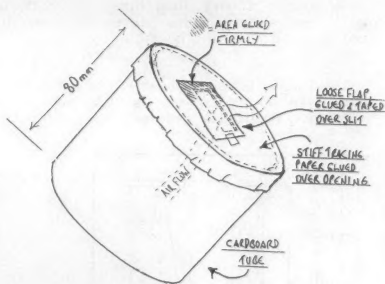
Then in 1987 I made a buzzing membrane for the bell-end of the sax. This was a short tube of cardboard which fitted snugly into the bell. The top was covered with a circular sheet of stiff tracing paper, into which I cut a small rectangular slit. Over the top of this I pasted a little flap of the same tracing paper, held down firmly to one end and loosely at the other with a little strip of adhesive tape. This attachment only worked on the sax's lowest note where all the valves were shut, but the funny little buzzing sound on that lowest note had a nice "punctuative" touch. I know that this isn't strictly a mirliton because it lets air through the device, but I think that sound-wise it is related. Again, I never really perfected the device as I moved on to



TOP AND CENTER: 2 approaches to kazooed saxophone, courtesy of Ernie Althoff. (The center picture shows the instrument as played by a pointy-nosed, bushy eye-browed individual, seen from above.)



BELOW: Sax bell buzzing membrane.



other things, but I think it could probably work much better as a buzzing attachment for an altered-length air path instrument like a trombone, trumpet or french horn.

So yes, experimentation with mirlitons is alive (or was, until I get time and/or inclination to get the little things going again!)

Ernie Althoff

I READ YOUR ARTICLE ON MIRLITONS with great interest in Vol. V #1 of the newsletter.

I thought perhaps the following information might also be of interest to your readers. I quote from Frank K. McCallum's 1969 publication by the Carlton Press, **The Book of the Marimba**.

P. 20, 21:

As described so far, bass resonators have an inherently weak response. But the use of vibrating membranes loudens them considerably. Near the lower pointed end of each resonator is a hole about 3/8 inch (.953 cm.) in diameter, over which is secured on a ring of pliable wax a circular piece of cured pig's or cow's intestine. The wax (cera de Campeche, or shoemaker's wax) allows the membrane to be tightened or loosened to give the best tension for the best tone. This device was brought from Africa, and in the colloquial Spanish of Guatemala is known as the **Charleo**, which term includes the sound also.

When the bar above is sounded the membrane vibrates sympathetically with the air column and gives a loud humming sound like that of a reed instrument, which dies out with the vibration of the bar. The membrane, or **Tela**, loudens the voice of the resonator enables the marimba to have the great range of notes it has and imparts the characteristic tone which is rich in overtones. Such marimbas sound well in an auditorium and can hold their own with an orchestra, but in a closed room are deafeningly loud.

The membrane is similar to goldbeater's skin, being very light and strong and about 1/1000 inch in thickness. A section of cow's intestine is tied at one end, inflated, and tied at the other. It is rubbed and pounded periodically, then hung in the shade to dry. In time layers of skin can be peeled off. When adjusted (on the resonator) the membrane will stay so for a very long time, but a **Marimbero** will always have spare pieces lest one break, which is happily infrequent.

P. 32, 33:

The Deagan Company created the **Nabimba**, which was like Central American Marimbas, having vibrating membranes and very low bass notes.

They were offered in any size up to seven octaves. About fifty nabimbas were made. Today their unique reed tone and hollow bass can be heard only from old phonograph records. In losing the Nabimba symphony music has lost a bass percussion instrument that blended perfectly with the other orchestral instruments, better than an ordinary marimba does.

P. 102, 103. Text accompanying **PLATE VIII. Resonators With Membranes:**

As shown, these are the inventions of the Deagan Company. At (a) we have the resonator of the Nadimba. The slotted cap (g) discourages its responding to adjacent bars (i), and the membrane unit terminates the lower conical ending (b), all protected by a curtain (c).

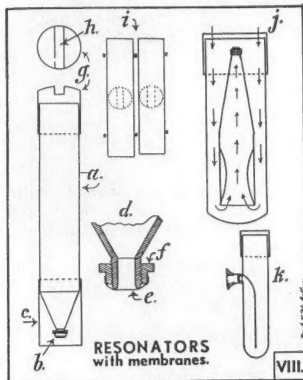
The membrane (gold-beater's skin or zephyr skin) is tied around the threaded nut (f) which upon being turned regulates its pressure against the smooth termination of the cone. R.H. Mayland patented in 1915 a similar device using a thin mica diaphragm instead of zephyr skin. He adapted it to organ pipes also.

Deagan resonators with an interior tube (j) and partition (k) are shown. These afford shortening of length and with other features should be of great interest to acousticians. On the resonator (k) the membrane unit is within a little "horn" on the tube's side. In the other resonator (j) passage of the sound wave is indicated by arrows, as it is reflected up from the bottom to pass through a compression chamber, then to be concentrated finally on the membrane. For experimental work, thin plastic, cellophane, thin leather and Mimeograph blue stencil paper can be tried. A badly adjusted membrane with a mismatched bar and tube can sound as horrid as the voice of the peacock or a reed organ pipe out of order.

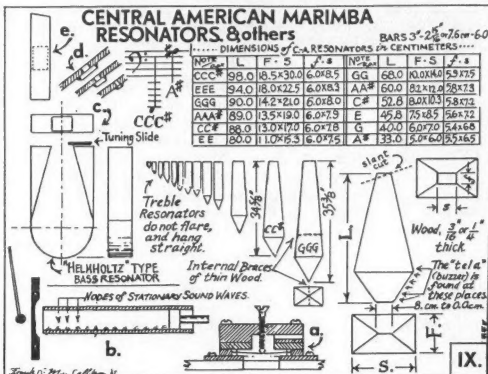
Text accompanying **PLATE IX Central American Marimba Resonators & Others:**

The **Tela** (buzzer) can be placed at various points on the lower end as shown. **Telas** are graduated in size from about 3/8 inches (in the bass) to about 1/8 inch in the high treble (d). However, larger diameters are not inadvisable.

The author's invention of an **annularly vibrating** membrane unit is shown at (a). The screw with a smooth end can create tension on



Plates from THE BOOK OF THE MARIMBA, by Frank K. McCallum, Carlton Press, 1969.



the membrane by using a screw driver. Better tone is assured.

Mr. McCallum built a bass marimba for use in his own concerts in which the **telas** were mounted in the tuning plugs of its square-sectioned wood resonators.

I've done some experimenting with mirlitons in connection with my (I hope) forthcoming book, **Wake the Marimba**. Experiments of particular interest involved tiny glass bead in shallow plastic or metal cups fastened to the bottoms of marimba bars, and those using thin brass reeds shaped into shallow "S" curves. Both will appear in the book.

Blake Mitchell

NOTES FROM RECENT CORRESPONDENCE

Tony Pizzo, noted bibliographer and discographer, writes that all five of Hans Reichel's albums (including **Dawn of Dachsman**, featuring the dachsophon and pick-behind-the-bridge guitars discussed in recent EMI articles) are available from Wayside Music, PO Box 6517, Wheaton, MD 20906-0517 at \$10 each plus \$1.75 handling for 1 to 2 disks. Wayside is a good source for close outs and European experimental music. They publish a yearly catalog and updates.

Incidentally, Hans Reichel will be coming out with a new guitars-only CD late this summer, as well as a duet CD with Tom Cora, a New York cello player who has developed a technique for using the cello to resonate a dachsophon-like bowed wood arrangement.

Sherrie Posternak of Vista Fine Crafts in Virginia reports that a special exhibit of traditional and experimental American musical instruments and sound objects is coming up soon. The show is **Sound Arts**, running August 19 through September 9, at Vista Fine Crafts, 8 North Madison Street, Middleburg, VA, 22117. There will be a reception, open to the public, on Saturday the 19th from 10 to 5, with many of the exhibitors present to describe and demonstrate their work. Hammer dulcimer builder and player Madeline MacNiel will perform. Phone (703) 687-3317 for more information.

The next **Sound Symposium** festival will be happening July 5-14, 1990, and sound artists interested in taking part should submit proposals for new works as soon as possible. The festivals, designed for anyone with a profound aesthetic interest in sound, take place every other summer at St. John's, Newfoundland. Participants include traditional musicians, avant garde musicians, environmental sound people, psycho-acoustic researchers, and various other stripes of sound explorers. Many of those to be partaking in the

1990 event are specifically involved in creating instruments and other musical sound sources.

Sound Symposium has a unique place in the hearts of people who have taken part in past festivals. Their comments point to several things that make the event special. Number one is surely the environment. St. John's partakes of all of the beauty of the Newfoundland coast. But is it extraordinarily beautiful in its sonic environment as well, or is it just that festival participants experience a period of heightened aural awareness while they are there? Participants also comment on the support and participation and general good spirit of full time residents of the area. Other comments highlight a cooperative, highly interactive and democratic music making and sound-exploring spirit among participants. The end result for everyone is an ear-opening experience.

For submission of proposals and for further information on Sound Symposium, write Don Wherry, Artistic Director, Sound Symposium, 81 Circular Rd., St. John's, Newfoundland, Canada, A1C 2Z5.

CORRECTION

In the article on harmonics guitars by Hans Reichel and Glenn Branca appearing in EMI's June issue, we directed readers to Hans Reichel's article "Crossing the Bridge" in in **Guitar Player** magazine, Vol. 23 #1, January 1988. The correct date for that issue of **Guitar Player** should have been January, 1989. Apologies to Hans Reichel and to **Guitar Player** for the mistake.

Also, Hans informs us that the address of his record company, FMP Records, has changed. FMP Records are now available in the U.S. c/o **Cadence Magazine**, Cadence Building, Redwood, NY 13679.

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THE PIATARBAGO ITS HISTORY AND DEVELOPMENT

By Hal Rammel

(continued from page 1)

a single musician playing more than one instrument at the same time, this ensemble is limited only by the mechanical capabilities and imaginative inventiveness of its creator. Despite its generally accepted status as an isolated novelty, it is a phenomenon with some identifiable historic continuity.

The historical survey that follows confines itself to one area of one-man band invention: instruments that place the musician sitting before a contraption facilitating ensemble performance by both hands and feet. Excluded here is the most familiar form of one-man band, the guitar, harmonica, vocal ensemble and its many variations (e.g., Henry "Ragtime Texas" Thomas' guitar and quills or Stovepipe No. 1's guitar and stovepipe, played jug fashion).² Also omitted are the far older combinations of pipe and tabor (from medieval jongleur to rural English "whittle and dubb," and their transplanted forms in the native music of South America and the Caribbean). A third category falling outside the present discussion are the immensely various permutations of washboard and miscellaneous homemade percussion.³

Sitting or standing, the feet have always been an important resource for expansion of the one-man band's ensemble sound. Whether providing foot-stomping time-keeping (e.g. Chicago's Maxwell Street regular Daddy Stovepipe)⁴ or more delicate timbral accompaniment as in the foot-played triangle of North Carolina's Will Blankenship in the 1930s (added to harmonica and autoharp), refining the role of the feet was often the impetus to further mechanical development. Percussion historian James Blades suggests that the foot-pedal operated pair of cymbals may have had its inspiration in the one-man band's use of a drum or cymbal operated by a cord attached to the performer's foot. While a foot-pedal bass drum and cymbal became a significant addition to the trap-drummer's kit in the early part of this century, it also played an exceptional role in the expanding capabilities of the one-man band.

Undoubtedly the most well known and well recorded one-man band is that of Jesse Fuller, whose invention of the foot-operated bass greatly expanded the sound of his music. Fuller called his invention the *footdella* (a combination of the words "foot" with "killer-diller"). It was an upright string bass with six piano strings hit by individual hammers attached to six pedals he played with the big toe of his right foot. Because it was limited to only six bass notes, he sometimes played tunes without the footdella. The sock cymbal he played with his left foot was also his own construction (except for the topmost cymbal), as was his neck harness (holding harmonica, kazoo,

and microphone plugged into the amplifier of his twelve-string guitar), and the stool he sat on to play. With his vast repertoire of blues, spirituals, rags and pop tunes (his "San Francisco Bay Blues" became a folk standard), Fuller is probably the only one-man band so fully recorded. The high spirited, well-integrated playing of his various instruments make his accomplishment well worth the attention and praise.

Like the Musiker in L. Frank Baum's *The Road to Oz* (1909), whose lungs were full of reeds and who had only to breathe to squeeze out his music, the key to elaboration of the one-man band lies in making the instrument an extension of the musician's body. Exemplary of such imaginative mechanical experimentation is the work of Fate Norris. Norris is best known for playing banjo in the hillbilly string band The Skillet Lickers, although poorly recorded and hardly audible in any of their many recordings. Born somewhere in northern Georgia in the 1890s, Norris played with the Skillet Lickers throughout their recording career from 1924 to 1931. He apparently had experience in the medicine show circuit and had a flare for comedy that included a "talking doll" and a complex one-man band of six instruments that he took to fairs and fiddler's contests throughout the south. An attendee at the Skillet Lickers' appearance in Nashville in 1927 reports:

Fate Norris, of Dalton, Georgia, the one-man wonder, who plays six individual instruments in an individual band, will also furnish entertainment. Mr. Norris has in his band two guitars, bells, bass fiddle, fiddle, and mouth harp. He devoted seventeen years to the mastery of his art.⁵

Fiddler Bill Helms recalls seeing Norris at a fiddler's convention in Chattanooga:

Fate Norris was there too, had a musical soap-box -- made out of soap boxes with a pocket knife, and strings from mandolins, guitars, fiddles, autoharps. Had pedals and knee pads. Played two instruments with his feet, played a mouth harp.⁶

There are no recordings of Fate Norris' one-man band, only these descriptions and a few photographs. Another newspaper account of Norris' appearance in Nashville adds, "It required fifteen years, Mr. Norris says, for him to perfect his performance." What took place over those fifteen years? How did such a band develop? No such information about Fate Norris exists, but there is a description preserved about another one-man band of similar complexity and construction heard and seen almost one hundred years earlier in London. Henry Mayhew's survey of London Street life in the 1840s and 50s, *London Labor and the London Poor* (A Cyclopaedia of the Condition and Earnings of Those that Will Work, Those that Cannot Work, and Those that will not Work), includes this testimony from a street musician known only as "blind performer on the

bells."

I started the bells that I play now, as near as I can recollect, some ten years ago. When I first played them, I had my fourteen bells arranged on a rail, and tapped them with my two leather hammers held in my hands in the usual way. I thought next I could introduce some novelty into the performance. The novelty I speak of was to play the violin with the bells. I had hammers fixed on a rail, so as each bell had its particular hammer; these hammers were connected with cords to a pedal acting with a spring to bring itself up, and so, by playing the pedal with my feet, I had full command of the bells, and made them accompany the violin, so that I could give any tune almost with the power of a band. It was always my delight in my leisure moments, and is a good deal so still, to study improvements such as I have described. The bells and violin together brought me in about the same as the piano. I played the violoncello with my feet also, on a plan of my own, and the violin in my hand. I had the violoncello on a frame on the ground, so arranged that I could move the bow with my foot in harmony with the violin in my hand. The last thing I have introduced is the playing of four accordions with my feet. The accordions are fixed in a frame, and I make them accompany the violin. Of all my plans, the piano, and the bells and violin, did the best,

and are still best for a standard.⁸

Except for this statement, no other personally related account of the gradual development of a one-man band exists. In the careful addition of each instrument and the technique and mechanical means to play it, there is a unique sort of virtuosity, a triumph of imagination and invention over physical limitation, not the least being blindness since one month of birth. Such inspired resilience is not uncommon among one-man bands and recalls this itinerant musician seen around Harlan County, Kentucky in the early part of this century:

Back before I can remember a travelling minstrel by the name of Charlie Page or Paige came through the mountains putting on little shows with puppets at the local schoolhouses. He was a one-armed man, his arm being off right up to his shoulder, but he played a fiddle, blew a mouth harp and rang a bell at the same time. My father said he held the bow between his legs, and had a harp holder around his neck and tapped the bell on the floor with his foot, and he said he was a fairly good fiddler.⁹

Knowledge of the existence of the one-man bands of Fate Norris and Charlie Page would be lost without the preservation of a few photographs and sketchy recollections of people who saw them. Such testimony illustrates the obscurity of this

Fate
Norris'
One-man
Band

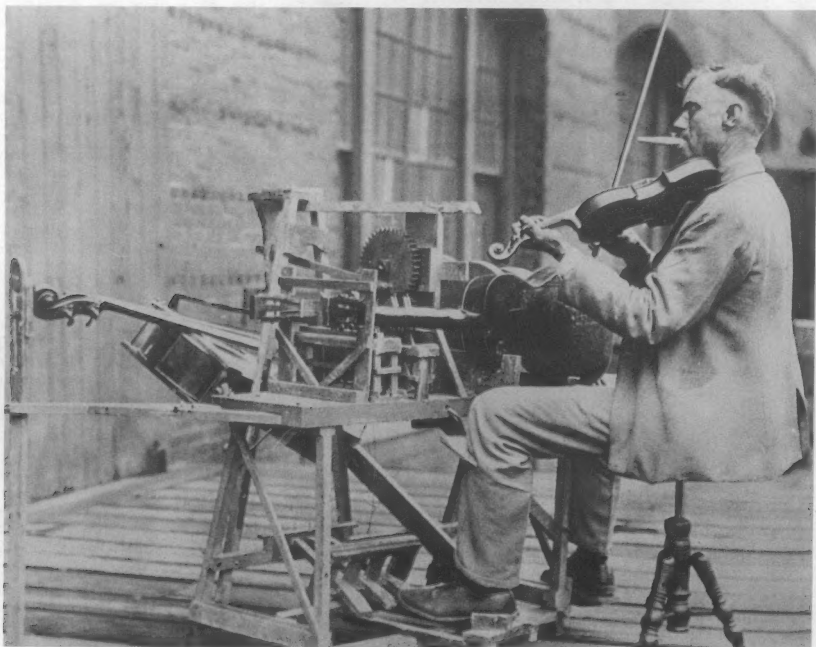


Photo
courtesy
of
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tradition. Its history has many such great gaps and sudden flashes of detail, demonstrating how incomplete and arbitrary the historical record can be in discussing almost any musical tradition.

Mayhew's "blind performer on the bells" was fifty-five years old when he related his story. He had been playing on the streets most of his life, for the previous twenty-three years alone, playing a piano he had rigged onto a wheeled cart. "I was one of a street-band in my youth, and could make my 15s. a week at it. I didn't like the band, for if you are steady yourself you can't get others to be steady, and so no good can be done." Jesse Fuller (whose calling card read "Lone Cat") had a similar experience, finding other musicians "all too busy -- running around, drinking and gambling."¹⁰ Daddy Stovepipe, Dr. Isaiah Ross (still performing blues with his guitar, harmonica, cymbal ensemble), and many others echo these sentiments, all affirming the independence of their enterprise.

Practical considerations like these are the most often expressed motivations of one-man band performers, but if everyone who experienced such frustrations felt moved to create a one-man band they would be far more in number. There is something deeper at work in this extraordinary impulse to play it all, alone, at one time, with all the requisite physical agility, and to play it so joyfully. There is a radical independence at work here, an urge to confront and explore human capabilities and possibilities to their limits, an urge to realize a unique and playful thought. In other words, even if the musical results may at times have been rough and musically limited, what is significant is that the attempt was made, that the idea was considered and acted upon, often with a lifetime of devotion.

Joe Barrick was born of Choctaw parents in Pauls Valley, Oklahoma in 1922. His first musical instrument, at age fifteen, was the mandolin; he recalls wanting something light he could play as he walked down the road. From a musician friend he learned his first three chords, but it wasn't long before those three chords were too limited and he taught himself a more complicated style of mandolin playing and moved on to fiddle and guitar. He walked and hitchhiked all over southeastern Oklahoma playing free at dances (or, rather, parties; dances were frowned upon). He learned tunes from other musicians and off the radio; few books or records were available to him. "You'd hear a tune on the radio, then go off and learn it right quick. Didn't have records. Seemed like you learned quite a bit that way. You remembered it!" One of Joe Barrick's earliest influences was Bob Wills. He greatly admired his fiddle playing and still plays a lot of tunes associated with Wills and his Texas Playboys.

Joe Barrick settled in California when he got out of the armed services and began playing in western bands, mostly on fiddle and mandolin. During this thirty year period, before moving back to Oklahoma fifteen years ago, he began, utilizing skills gained in his regular employment as a carpenter, to design and build his own instruments. One of his first used the skull of a cow as the body. "It was western music. Everything was western ... and everything western you'd always see a cow's skull laying around. I just got the idea of making one so it'd be western music."

The cow's skull guitar and mandolin, the Oklahoma guitar (with its body shaped like the state of Oklahoma), and the toilet seat guitar ("set on it") were all made around this time when he began playing by himself. "I used to play these just for show. That's when I started to want to play by myself. It was hard to keep anybody together to play with anybody."

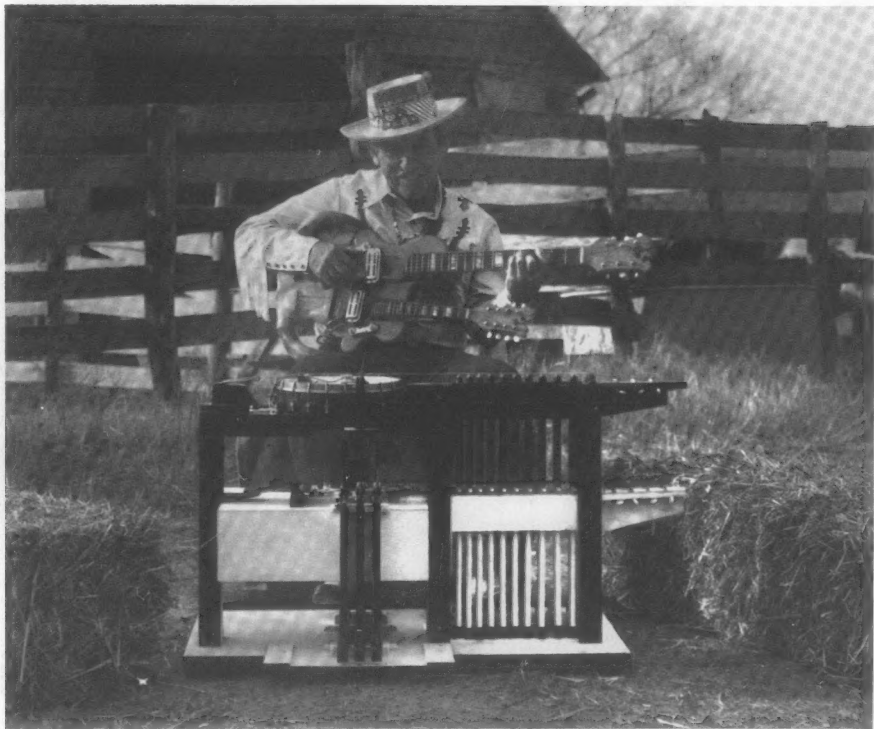
Thinking about how to play a backup rhythm for himself (especially for his fiddle playing) without having to rely on less dependable musicians, led to ideas about how a rhythm guitar could be played without the hands but with the feet. His solution was the invention of the **piatar**, a guitar played with hammers like a piano and operated with the feet. Pedals at his right foot control hammers that strike the strings of the guitar, while pedals worked by the left foot operate moveable frets that push up on the strings determining the chords that will be played. It began as an old board with a guitar neck and pedals mounted on it. He "pictured it" long before actually trying to build the device, and when he did, "I surprised myself with how good it sounded. It was just simple. That's where I learned how to play it ... on that one flat piece of board. So it worked out good. Then I made another one that had all this other stuff on it. That's the way it worked out. I wanted to see how it worked."

Joe Barrick's next version of the piatar, built about fifteen years ago, added bass guitar and banjo, and later a snare drum. These sit in shelf-like arrangement in a box at his feet. As



Unidentified One-man Band (from a promotional postcard with no written information).

Joe
Barrick
with
his
Piatar-
bajo



with the piatar, hammers operated with the right foot strike the drum and strings of the banjo, bass, and guitar on the downbeat; treadles worked by the left foot operate the moveable frets and play the chords. Hence, the **piatarbajo**; its name derived from the instruments utilized in its invention. Along with the piatarbajo, he plays a double-necked guitar/mandolin that also has a cow's skull as its body. To this he sometimes adds harmonica (held in a neck harness), and, occasionally, fiddle. This arrangement is designed so that he can move smoothly from one instrument to the next: "to switch to it and keep goin'." The fiddle is not part of the apparatus yet. "I have to stop and pick it up. I play the guitar and mandolin mostly, because it's built together." However, the piatarbajo was designed so that more could be added to it; he has not gotten around to a final "dressed up version." "I try to do it all! Almost have to ... by myself ... Well, might as well do it all. I do a little of everything."

Each instrument on the piatarbajo has its own pick-up mike and comes out of a separate speaker. There is a regular bass amp for the bass part so that it sounds like a bass guitar. There are separate amps for the guitar and banjo and they sound out on the downbeat with the snare drum, so that it all blends together. The bass is on one

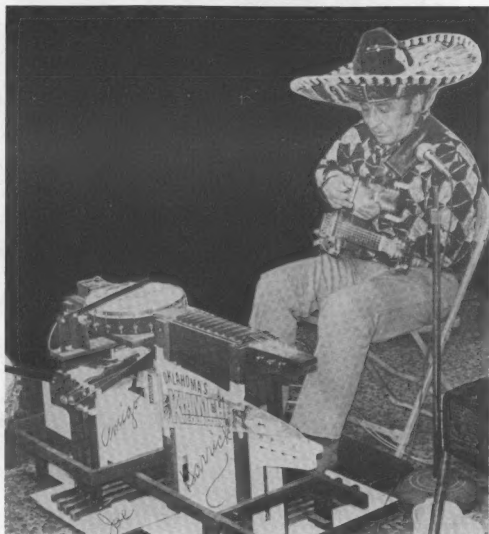
side and the other amps on the other so that it will sound like individual musicians playing. "It's not all just one lump. It don't come out like that. It sounds like separate pieces." This balancing of the individual instruments is of crucial importance and Joe Barrick takes great care in achieving that full, balanced sound. "You can tell when it comes out good. Boy, you can hit it and it rings out! Well, you know you got it!"

Joe Barrick's repertoire draws on the music he has listened to all his life, mostly country songs, lots of tunes associated with Bob Wills: "San Antonio Rose," "Spanish Two-Step," "Joe Turner Blues," "Over the Waves." When asked to name favorites, he mentions "Sally Goodin," "Arkansas Traveller," "Eighth of January," "Mockingbird," "The Waltz You Saved for Me," "Faded Love." He plays clubs much less frequently today than he once did and much more often for special community events; for openings, music festivals in south-eastern Oklahoma, parties where he is invited to play, fundraisers, VFW get-togethers, events sponsored by Choctaw organizations (in 1977 he received an award of honor from the Choctaw Nation of Oklahoma "in recognition of outstanding work designing musical instruments"). He regularly appears at the annual World Series of Fiddling in Langley, Oklahoma (organizers of this event awarded him a Citation of Appreciation last year for

his efforts "to preserve the music of past decades and his performance on the piatarbajo"). Barrick also takes the piatarbajo to schools and nursing homes and it's always a special event for him when people want to get up and dance. "I play for some of these rest homes and they like to dance. Some of the bands that come there didn't want them to dance, so they'd ask me if I'd mind if they'd dance. 'Well, that's what I want you to do! I can play better when you're dancing!' It's hard to play for someone that just sets there." Music is a social event for Joe Barrick: "As long as I can make music and have a few laughs I'm happy."

As a young man, Barrick had the feeling that there was more to music than three mandolin chords, and, although he has greatly expanded his array of instruments and is carrying much more than a single mandolin, he has creatively preserved his independence and self-determination. "No one tells me when to practice and I can play any song I want without having to hope the rest of the band likes it." With a firm sense of the sound he seeks to achieve, a sound that rings out and brings joy to others, Joe Barrick sets music to the dance of life. He plays it all himself, and the elusive tradition of the one-man band is living and thriving in his life and music.

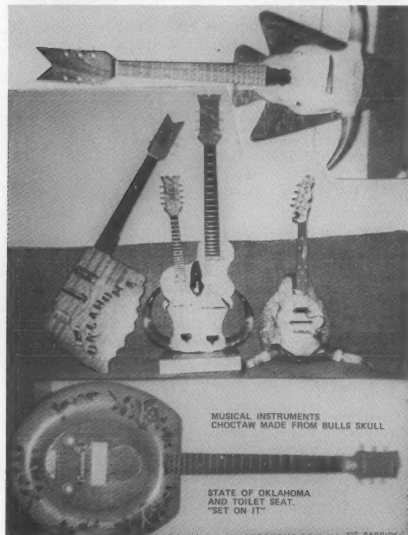
As a category of musicianship, the one-man band transcends cultural and geographic boundaries, spans stylistic limits, and defies conventional notions of technique and instrumentation. From the musicking of centuries of street performers and itinerant musicians to the elaborate



"Amigo / Joe Barrick." -- A signed promotional photograph.

inventions of Fate Norris, "blind performer on the bells," and Joe Barrick, and the further-out improvising of Rahtann Roland Kirk, Jerome Cooper, and Jon Rose, the link uniting these diverse ensembles can be found in their close relationship to the beginnings of all musicking, to the playfulness that inspires all the earliest of musical experiences, of imagining and inventing, and of realizing what was once only imagined.

Electric guitars made by Joe Barrick



MUSICAL INSTRUMENTS
CHOCTAW MADE FROM BULLS SKULL

STATE OF OKLAHOMA
AND TOILET SEAT
"SET ON IT"

This historical survey of one-man bands is part of an ongoing project. The author is interested in hearing from anyone with information, photos, recordings, anything about one-man bands, long gone or currently active. Hal Rammel may be reached at Apartment 2 South, 1622 West Sherwin, Chicago, IL 60626.

FOOTNOTES

1. Quotations from Joe Barrick are drawn from interviews conducted by the author in December 1986 and February 1987.
2. Henry "Ragtime Texas" Thomas' guitar and quills -- an early African American panpipe -- can be heard performing "Old Country Stomp," recorded in Chicago in 1928, presently reissued on *Songsters and Saints*, Vol. 2 (Matchbox M5EX 2003/2004). Stovepipe No. 1 (Sam Jones) played guitar and harmonica, occasionally adding a piece of stovepipe played in similar fashion to a jug for bass as well as melodic lines. A familiar figure on the streets of Cincinnati in the 1920s, his "A Chicken Can Waltz the Gravy Around" (with David Crockett; guitar) has also been reissued on *Songsters and Saints* Vol. 2.

(Footnotes continued at right)

SPOTLIGHT ON WILLIAM ROOF

By JoAnn Jones

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Haven't you always wanted to be able to make music? Personally, I've always wanted to play the piano. The keys I spend a lot of my time on, however, are not ivory.

William Roof, an 87 year old Lyons resident, has been making music for as long as he can remember and does it with several instruments - sometimes all at the same time.

"People may think I'm goofy (with cymbals under my arm, foot on a drum pedal, and a harmonica cupped to my lips), but it sounds good," jokes Roof.

William has played for local seniors at the Lyons Senior Center as well as for area elementary school children. He performs at the Lyons Volunteers of America (VOA) meal site during the warmer months. "It gets me out of the house for a good meal and the chance to play," says Roof.

Among Roof's favorite instruments is the harmonica. "When I bought my first one, I had no idea that they came in different chords," says Roof. He now owns some 30 to 40 harmonicas, some dating back fifty years. He also enjoys the mandolin and

Photo by JoAnn Jones, courtesy of Spotlight Newspapers.



Piatarbajo footnotes, continued

3. Further detail about these other varieties of one-man band can be found in an earlier version of this article, "Joe Barrick's One-Man Band: A History of the Piatarbajo and Other One-Man Bands," *Musical Traditions* 7 (London, 1988).
4. Born in 1867, Daddy Stovepipe (Johnny Watson) spent his last years performing on Chicago's Maxwell Street. No relation to Stovepipe No. 1, Daddy Stovepipe played guitar and harmonica, and made a point, in an interview with Paul Oliver, of identifying his foot-stomping as his third instrument. Daddy Stovepipe here is mentioned here as only one of many guitar/harmonica/percussion one-man bands that could be cited.
5. Charles K. Wolfe, "When the Skillet Lickers Came to Nashville," *The Grand Old Opry* (London: Old Time Music Booklet 2, 1975), p. 102.
6. "Interview with Bill Helms," *John Edwards Memorial Foundation Quarterly* Vol. 2, Part 3 (June, 1967), p. 57.
7. Wolfe, p. 103.
8. Henry Mayhew, *London Labor and the London Poor* (New York: Dover Publications, 1968, reprint of 1861-62 edition), Vol. 3, p. 161.
9. Edward Ward, "Music in Harlan County, Kentucky," *John Edwards Memorial Foundation Quarterly*, Vol. 15 (Spring 1979), p. 21.
10. C.H. Garrigues, "Jesse Fuller," liner notes to Jesse Fuller, *'The Lone Cat'*, Goodtime Jazz M-12039.

keyboards.

Roof's musical interests and talents don't stop with just playing. He has engineered and built several string instruments using common household objects. His "hoe guitar," for example, is just that - a garden hoe with a single guitar string stretched down it's length. Roof sets one foot on the hoe blade to stabilize the instrument, picks the string with the left hand and changes notes by riding a cocoa can up and down the string with his right. The sound emanates loudly from the hole in the cocoa can. He expanded on this idea when he built his "cigar box guitar". Using a mop handle as a backbone, Roof attached two wooden cigar boxes about one third of the way up the pole. He cut three long slashes in the tops of the boxes hoping that the sound would echo from them. He then carefully lined the boxes with dental acrylic (tools of the trade from which he retired) to form a soft, but continuous piece. The acrylic, however, turned out to be a very bad conductor of energy. "It made great dentures, but hardly vibrates at all," laments Roof. William uses his trusty cocoa can to produce depth of sound when playing his cigar box guitar. And besides, painted bright red, it's still a neat thing to see.

WHIRLED MUSIC

By David Toop and Max Eastley

This is the first of three articles that will be appearing in EMI on the subject of swung music -- music made by instruments played by whirling or spinning. In this first piece, British musicians David Toop and Max Eastley talk of their performances with a group devoted entirely to spun or whirled sound sources starting in the late 1970s. Along the way, they afford us a look at the great variety of traditional whirled instruments from which they drew their inspiration. The second article in the series, slotted to appear in EMI's next issue, comes from Sarah Hopkins, Australian composer and performer who works with the whirled corrugated tube aerophones she calls "whirlies." In the same issue we will have additional material on the unique acoustics of corrugated tube aerophones, both whirled and blown. The third article in the series will be coming from Northern California musician Darrell DeVore, maker of swung Windwands and D-Trads.

Here now, are David Toop and Max Eastley.

In his book, *The History of Musical Instruments*, Curt Sachs asks a number of questions: "But a bullroarer? Is it really acceptable that every human tribe must invent an oval board held by a cord and whirled around the head for certain magical purposes? Is it convincing that merely because of a natural evolution such a bullroarer should have been almost universally connected with the fish and that paleolithic hunters in France as well as modern Eskimos should both have the idea of dentating its rims?"

For Sachs, and for many other students of musicology and anthropology, bullroarers and other related noisemakers have been something of a mystery, both from the point of view of their evolution and their widespread distribution. Instruments like the Ngetundo (lion), a bullroarer used in circumcision ceremonies by the Nandi people of Kenya, the Eskimo Tchouringui, which imitates the whistling of the wind, or the Guewova (mask with the big voice), a bullroarer of the Dan tribe of Cote d'Ivoire and Liberia, were once an important part of ritual ceremonies. Often they were used as an institutionalized deception in initiation rites, their howling sound used to portray the voice of spirits, the living dead, meteorological sounds or noises used to coax mythological monsters out of their hiding places in the ground or under the water.

In his paper, "Sound-Producing Instruments in Traditional Society: A Study of Esoteric Instruments and Their Role in Male-Female Relations," K.A. Gourlay writes, "It is difficult to determine whether greater importance should be placed on the sound produced by these instruments [bullroarers and sacred flutes in Papua New Guinea] as inter-

preted within a symbolic and ritual context, or on the aspect of secrecy which ... dominates the rites." It is hardly surprising that bullroarers should once have been so secret and symbolic. As simple as a soundmaker can be, the noise they make can range through guttural groans, coughs and barks, continuous low moans or high pitched howls reminiscent of a rip saw in a timber yard.

BULLROARERS. Top, right and left: from England (Sussex), and America (Arapaho). Middle: from the Apache and another from Sussex. Bottom: from India and New Guinea.

Interpretations of the role of the bullroarer vary. For such a rudimentary object, it has generated an enormous quantity of description, analysis and theory. This includes Sachs on the ritual functions of musical instruments, Otto Zerries' German monograph of 1942, *Das Schwirrholz*, Alan Dundes' paper, "A Psychoanalytic Study of the Bullroarer", Carl Gustav Zizkowitz in his *Musical Instruments of the South American Indians*, and an extended forage through the subject in *From Honey to Ashes*, the second volume of Claude Levi-Strauss' *Introduction to a Science of Mythology*.

These analyses and theories are too involved to investigate in this context yet they are important, even in relation to contemporary music making or musical instrument invention, because they highlight the symbolic power of even the most primitive of cultural artifacts.

Such whirled instruments as the bullroarer have surfaced from time to time in contemporary performance, but they have tended to be used as a dramatic intervention or novelty. In 1977, however, improvising percussionist Paul Burwell climactically concluded a performance in London by violently whirling heavy Chinese cymbals and banging them on the floor, producing spectacular Doppler effects. Sensing the danger, musical sculptor Max Eastley, along with musicians David Toop and Steve Beresford, moved to the back of the hall for safety.

Eastley was inspired by the strong visual and acoustic effect of this whirling and suggested to Burwell, Toop and Beresford a performance created entirely by whirled instruments. Max Eastley, a London based artist with a background in music and an early interest in kinetic sculpture, first made an instrument which used circular motion as an audio-visual element in 1972. This was called the Centriphone -- a thread of nylon on a small motor which suspended a needle or fine shaft of steel over a metal plate. The needle danced circles over the surface of the plate, producing a complex stream of minute percussive sounds and resonating the harmonic series inherent in the metal.

The appeal of an instrumental ensemble with a self-imposed restriction of this type is fairly obvious. String orchestras, brass bands, percussion ensembles, Gamelan orchestras or an all synthesizer group like Kraftwerk all present themselves with formal unity and audio euphony. Whirled Music, as the group and its public performances came to be known, grew out of a context of mostly improvised, occasionally composed music, which tended to be intimate and introspective, perhaps as a reaction against the excesses of early Seventies free jazz. The act of whirling, with its physicality and potential danger and its abrupt dynamic contrasts, was appealing.

The exploitation of the circle, or circular motion, in Max Eastley's work grew from using small electric motors. A slow motor speed would tend to drag the object -- perhaps a steel rod bumping its way over a circle of stones or bamboo rods -- whereas faster speeds would create kinetic sculptural tension. When objects are whirled at speed there is a feeling of excitement and threat. Objects could fly through the air at any moment.

This sense of the instability of mechanical systems, the potential chaos of speed, has been glorified by artistic movements like the Italian Futurists or, during the 1960s, Destruction in Art, and particularly the sculptor Jean Tinguely.

An additional attraction of Whirled Music was its (temporary) solution of the problems that have been attacked innumerable times by mixed media events. How to present music in a form that is visually exciting yet does not impose irrelevant dramatizations, dance, costumes, films, color slides and other unrelated paraphernalia? The four musicians who performed Whirled music wore protective masks, designed and made by Pamela Marre. At first these were minimally decorative in shape but this was found to hamper movement. Plain wicker masks with eye holes, ear holes and a mouth hole for blown instruments were best. They prevented serious injury from a blow to the head yet made each musician impersonal and gave the performance an air of ritual without any striving for bogus ceremonial effect.

The group debut was in 1978. One early discovery was the formula that effort could be in inverse proportion to effect. Energetic whirling might produce only intermittent noise followed by exhaustion and embarrassment while a gentle whirling of a small instrument could be musically very effective yet visually unimpressive. This was one reason for expanding the number of instruments by searching out commercially made variants on the whirled theme -- usually toys -- or making and inventing new ones.

The idea of Whirled Music was given a liberal interpretation, expanded to include spun and twisted instruments in as many variants as could be imagined. An early press release was seized upon by the English satirical magazine, "Private Eye", for their Pseuds Corner. A cartoon depicted an elderly couple cowering behind a net as tubas and cellos flew through the air in their direction. This was, at times, not far from the truth. A net was hung between performers and spectators and on the one occasion when this proved impossible a member of the audience was narrowly missed by a flying cymbal. At times like this there seemed a clear correlation between musical technology and the technology of weapons.

Some of the instruments suggested weaponry despite their functional design. Using the principle of the Humming Bee, a whirled toy usually made of a cardboard half-circle with elastic stretched over one edge, Max Eastley developed his Darts: an arrow-like instrument consisting of a five foot long shaft, a set of flights and a V-shaped fittment at the front across which is stretched a length of elastic. The dart is fitted with two strings leading to a heavy swivel and a single string which is held by the player. The dart can be either whirled horizontally around the head or vertically. The faster it goes the higher the pitch. A circle with a diameter of up to forty feet could be formed although this was only possible in outdoor performances.

Other instruments had functional origins but had fallen into disuse. Large wooden cog rattles were once used for air-raid warnings during wartime and later used by soccer supporters to en-

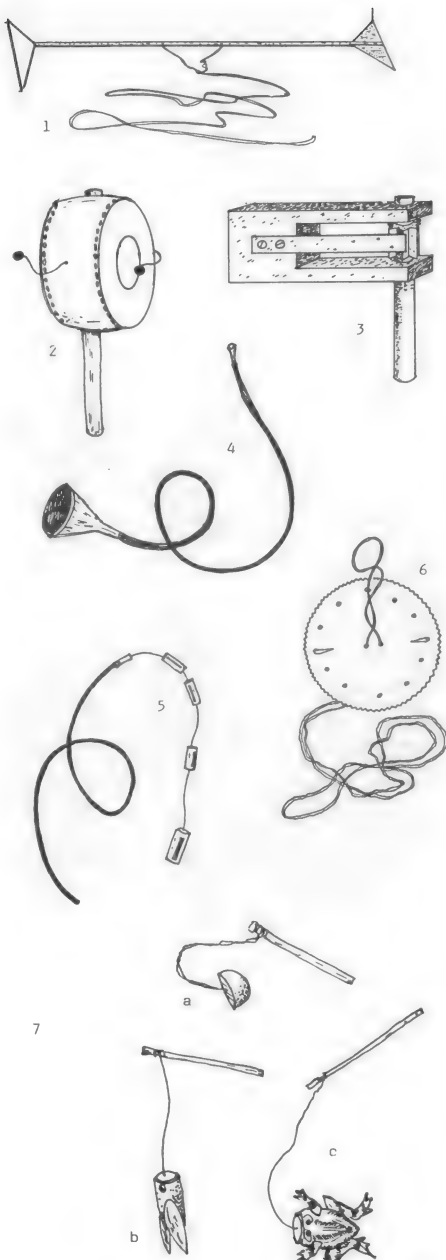
courage their team with a burst of noise. Their machine gunning sound combined alarmingly with the noise of Tibetan style pellet drums -- large Chinese drums with a handle played by lead weights on strings -- and Soft Trumpets, the soft Trumpet being a latex tube tube with a saxophone, trumpet, siren, bird decoy or whistle mouthpiece at one end and a funnel at the other.

Many of these instruments showed complex variations in their acoustic effect on the listener. Some demonstrated the Doppler effect, described in E.G. Richardson's book *Sound*, as "the name given to the apparent change in frequency of a moving source." Percussion instruments like the Kyezee (a Burmese shaped percussion plaque) attached to rope and swung in a wide arc would spin on their own axis after hitting the floor, adding another dimension of movement to the Doppler effect and the loud/soft cycle heard by a stationary listener as the circling instrument swung towards them and then away from them. Small Chinese cymbals attached to elastic would jiggle and vibrate as they bounced, giving a shimmering effect to the overtones of the metal. At the same time the elastic created a visual counterpoint of moire patterns against the background of strong lights. Such pyrotechnic optical effects were later explored more thoroughly by Paul Burwell in his Bow Gamelan Orchestra, whirling fireworks, flaming steel wool and other life-threatening creations.

For Whirled Music, the moire pattern effect was at its most effective with the simplest of all whirled instruments. First discovered by Max Eastley when he stretched lengths of elastic outdoors in high winds, this was an enormously long piece of heavy elastic of the type used by model aircraft builders. Pulled into a long rectangle with a performer at each corner, the elastic would be whipped in a circular motion. The resulting ornithological sound is difficult to describe but easy enough to discover with quarter inch elastic and two or more volunteers.

Many of the sounds made by these modest instruments are surprisingly rich. Small friction drums -- a miniature drum with a membrane head which is spun round a stick with a resined groove -- made somewhat belligerent animalistic sounds despite their size. If a small instrument could be so charged with menace then surely a larger version would multiply the drama. Any qualms about faulty reasoning were cast aside in a temporary fever of "bigger is better." Huge bullroarers were constructed which fluttered like crippled butterflies, producing infra-sonic grumbles and tired arms. A giant buzz disc was attempted -- a relatively huge central wood disc whirled by the twisting motion of the looped string which ran through it -- but this was inaudible and exposed the two operators to the risk of crushed fingers. An oversized Humming Bee was similarly a failure because of a viciously unpredictable flight path which constantly threatened the user with decapitation.

Multiples were rather more successful. A rubber tube with a whistle for its mouthpiece might be connected to a string of bird whistlers -- small tubes of metal or bamboo, closed at each





FACING PAGE, top to bottom:

1) Max Eastley's five foot long whirled dart; 2) a Tibetan pellet drum; 3) an English cog rattle; 4) a soft trumpet; 5) a multiple whirler (flexible tube whistle with small edge-tone whistles attached which sing when they whirl through the air); 6) a buzz disk from South America (after Izkowitz); and 7) friction drums from a) India, b) Hong Kong, and c) England. They sound when the string against the resined stick generates vibrations which are transmitted via the string to the small membrane on the device at the end.

ABOVE AND BELOW:

The Whirled Music group in performance.



end and with a thin slit running along one side. The effect of four of these in concert would be to create difference tones from the whistles, Dopplering and a high pitched twittering sound from the bird whistlers. The big bird whistler, made from a large plastic candy jar with a string through the lid and a slit cut in one side of the jar, also proved impossible to resist and was slightly more workable than the other giantisms. Its sound was like a rather alarming wood pigeon.

Other combination type instruments worked well. Children's humming tops could be set spinning on the head of a bass drum, amplifying the humming of the top and resonating the drum in an ominous rumble. The simultaneous use of four humming tops in performance had the additional dubious benefit of encouraging the type of joke beloved by all talk show hosts: "Ah, so you travel with the Four Tops?" This identifiable aspect of Whirled Music, appalling jokes aside, proved to be an asset in that people normally immune to contemporary music or developments in musical instrument invention were often fascinated. The corrugated plastic whirley tubes that became a brief craze in the late Seventies were one recognizable element in an otherwise "experimental" musical event. Many of the instruments may have had their origins as what Claude Levi-Strauss termed the "instruments of darkness" but they have become children's toys, easily available on expeditions to worldwide branches of Woolworths.

This usage of the ordinary extended to the whirling of cheap electronics -- a sort of "fandy on a string" principle. Personal alarms, radios, small cassette players, tiny loudspeakers connected to adjustable sine tone generators, microphones connected to portable amplifiers whirled in front of the loudspeaker to give discontinuous feedback (partly inspired by Steve Reich's "Pendulum Music") were all swung in circles creating a kind of squealing urban cacophony.

phony reminiscent of a stroll through London or New York streets with their mobile radios, ambulance and police sirens and general peripatetic ambient racket.

As a performance, Whirled Music attempted to improvise coherence out of these often unpredictable and wayward instruments, creating music rather than pure demonstration of gimmickry. It ranged from the occasional absurdity and amusement of toys (the tin Chicken Box operated by turning a little handle) or impractical, frankly useless, instruments (a bird whistler on a long arm mounted on a high tripod and powered by wound elastic unleashed by cutting a thread, reminiscent of Paul Klee's Twittering Machine, to the alarming and crude noise of metal canisters dragged in a circle, the primeval whirr and howl of four bulloarers in concert or the gently soothing sound of four small home-made humming bees constructed from semi-circles of bent wire held taut by lengths of elastic).

Whirled (or turning) music is arguably the most influential development in 20th century music in the shape of the record player. The group acknowledged this reference with a brief burst of music during each performance from an off-center 45 rpm disc played backwards on a child's plastic record player. On a broader plane, and hopefully without being too pretentious, the twelve performances given between 1978 and 1984 derived some of their impact from strong images of circling and cycles, orbiting motion and the battle against, on the one hand, inertia and the pull of gravity and, on the other hand, chaos.

For even the most unambitious instrument maker, whirled music affords gratifying opportunities for experimentation. For the truly ambitious, however, there are even greater possibilities of large scale, high risk projects suggested by fairgrounds, helicopters, revolving restaurant towers and other examples of whirling technology.

Revolving sound on a civic or architectural scale certainly exists. There is, for example, the Turkish Dink and the Cingirdak, both mentioned in Laurence Picken's monumental book, *Folk Music Instruments of Turkey*. The Dink was, according to Picken, "a fulling-mill, in which woollen cloth is shrunken by soaking in water and beaten by a wooden hammer, actuated by a water wheel." The name Dink was also used for a noise-making variant used for animal scaring near maize fields. Two trip hammers were activated by the revolving water

wheel, bashing tin cans in alternation. Similar devices have been noted in Vietnam, where Georges de Gironcourt wrote in 1942 of "hydraulic orchestras", and Java, where Jaap Kunst documented the Talaktak, a tilting bamboo operated by falling water and said to result in "an intriguing and capricious series of notes."

The Turkish Cingirdak was a therapeutic roundabout for children suffering from stomach ailments of various kinds. A plank is mounted on an upright pole whose hemi-ellipsoidal upper end is coated with a suspension of charcoal in animal fat or butter. Children would sit on either end of the plank, which as it revolved would make "an intense squeaking noise," said to be primary to the cure.

A more modern therapy was recently seen in the gambling resort of Lake Tahoe. Caesar's Palace Casino featured a circular bar, ringed by dejected losers. In the center of the bar was a slowly revolving column, seated on which were two musicians, Kenny and Wayne, playing bland versions of country and western, pop and soul hits on guitar and keyboard as they turned.

Despite the fact that Whirled Music employed up to 150 instruments during a performance, the Turkish roundabout and the gamblers' bar indicate possibilities hitherto undreamed of.

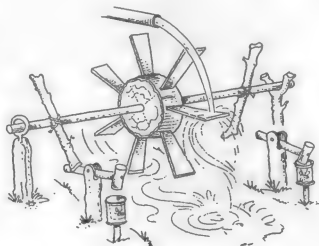
Records of Whirled Music, including live performance as well as indoor and outdoor recordings in a variety of locations, are still available. Enquiries to: David Toop, 7 Topsfield Road, London, N8 8SN, UK.



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An animal-scaring Dink, reproduced from Laurence Picken's *Folk Music Instruments of Turkey* (Oxford U. Press, 1979).



A HISTORY OF SAMPLING

by Hugh Davies

Wouldn't it be great if you could somehow capture any sound existing in the world, and build it into a musical instrument, enabling you to manipulate it freely in pitch and rhythm?

That, of course, is what is done by the digital samplers that are now becoming common. And, while the digital technology which makes them possible has only recently become practical for widespread use, the idea of borrowing voices for musical instruments has been around for much longer. A moment's thought will reveal that such instruments can take a wide variety of forms based upon diverse methods of borrowing that can be employed. In the article that follows, Hugh Davies looks at sampling instruments, broadly defined, from a rare historical perspective.

Hugh Davies is a composer and instrument inventor living in England. He has published a wide range of studies on 20th century electric and acoustic instruments, particularly as the main contributor in this area to the *New Grove Dictionary of Musical Instruments* (1984).

Sampling is a digital technique, first devised by Alec Reeves in 1937-38 under the name pulse code modulation (PCM), in which the waveform of any sound can be analyzed and/or synthesized simply by measuring its amplitude or loudness level at each of a sequence of minute "vertical" slices. Because, for musical purposes, these slices are normally made at a frequency of 40- to 50,000 times per second, in other words twice the highest audible frequencies, every nuance of even the most complex waveforms can be captured. Since the late 1970s the term has also come to be applied in music to special instruments and digital recording systems which use PCM sampling to analyze external sounds for subsequent resynthesis, and it is this application that is referred to in the title. For the lack of any better word, it is here used to describe all other methods for storing and replaying sounds.

In 1878, several months after his invention of the cylinder phonograph, Thomas Alva Edison proposed various possible applications for the machine. One of these was a system (which does not appear to have been constructed) for teaching the sounds of each letter of the alphabet, in which a set of keys identified by single letters activated the playback of individual sections of a long cylinder that contained the spoken forms of those particular letters.

The phonograph was the first system ever to be devised for storing and replaying any chosen sound or sequence of sounds, involving a special storage

medium on which the recording could be permanently retained. In the following century a considerable variety of other recording systems has been developed, all of which have been proposed or utilized as the basis for musical instruments, whereby, cuckoo-like, the instrument has no voice of its own, but "speaks with the voice of another instrument."

Such a concept was not completely new. Sound making instruments designed to imitate previously existing sounds, from the imitative stops on pipe organs to simple talking dolls ("Mama"), had long been known. In none of these, however, could new sounds be recorded; the specific nature of their sound generating systems allowed them only to imitate specific kinds of sounds.

Finally, the very earliest, albeit unwitting, form of sampling. Dr. Richard Woolbridge has experimented with retrieving sounds (but not, so far, speech) from the immediate environment that were "recorded" in the decoration of some old pots, where a pointed stick was used to make fine grooves while the potters wheel was turning, including the sound of the wheel itself. Gregory Benford's science fiction story, "Time Shards" is based on this.

In 1887 Emile Berliner was the first person to extend the idea of Edison's cylinder phonograph successfully, as the disc gramophone. In the following decade Valdemar Poulsen developed the Telegraphone, the first magnetic recorder. The earliest proposals for recording systems as the basis for a musical instrument were several keyboard phonographs using multiple prerecorded cylinders or discs (including patent applications by Michael Weinmeister, Austria, in 1906, Antoine Chataud, France, in 1907, and Demetrio Maggiora with Matthew Sinclair, Britain, in 1908), and an electromagnetic system by Melvin L. Severy, the inventor of the Choralcello; part of his US patent 1218324 (applied for in 1907, but only finally granted in 1917) describes the possibility of inscribing recordings of musical notes onto rotating magnetic discs. Only after World War I did other inventors patent, and possibly in some cases actually construct, musical instruments that were based on one or other of these sound recording techniques. Early patents were granted to K. Fiala (Germany, 1920), R. Michel (Germany, 1925), A. Douilhiet (France, 1925) and, especially, Charles-Emile Hugoniot (France, 1921-22) that used electromagnetic wires, discs or cylinders as the recording medium. Around 1930 A. Schmalz and Earle L. Kent also explored such approaches, the latter with loops of metal ribbon. Electrostatic discs containing sampled waveforms photoetched from oscillograms were proposed in a British patent by Estell Scott (1937). Other similar patents continued to be taken out up to at least 1950, but none of them led to an effective instrument. It was not until 1964 that the Mellotron was marketed, a very successful instrument based on current magnetic tape

recording technology.

Early magnetic recording systems had a number of problems, including the difficulty of creating a magnetizable surface that was completely constant, the wear and tear produced by its contact with a playback head, and the lack of an adequate frequency response. Of these, only wear and tear applied to electronic instruments based on gramophone discs. But although such instruments were explored in the late 1920s by J.B. Blossom, N. Banks-Cregier and others, they were also unsuccessful. The introduction of the optical film soundtrack for the sound film at the end of the 1920s added a new recording medium in which these problems were largely solved. The sound is photoelectrically recorded as a narrow track beside the visual images, and the fact that it is visible means that it can even be monitored and analyzed. Most of the photoelectric organs and organ-like instruments from the late 1920s and the 1930s were based on the mechanism of a rotating disc that interrupted the passage of a beam of light between its source and a photocell (already used by Hendrik van der Bijl in 1916 and envisaged in 1921 by Hugoniot), thus avoiding direct contact with the surface of the recording. Many of these systems used a principle derived from that of the siren, interrupting the light-beam by a rotating opaque disc in which holes or slits had been cut (sometimes in combination with a static waveform mask).

Most of these were not designed to reproduce pre-existing sounds, and so do not concern us here, but a few did have that capacity. They were based on photographically-produced transparent glass or celluloid discs on which patterns were marked.

These latter were created by one of two techniques. In the first, more common method, the patterns (representing audio waveforms) were initially drawn by hand and then photographed; some more experimental approaches even involved photographing letters of the alphabet and facial profiles. In the second, visual representations of sounds from existing musical instruments, such as could be shown on a cathode ray tube, were photographed. (Existing photographic images that are not representations of an acoustic source could also be used, as in a recent short abstract film by Guy Sherwin in which moving images of railway tracks are also the source of the optical soundtrack.)

The difference between these two techniques does not necessarily produce any great difference in the resulting sound, especially if an accurate visual representation were copied by hand. It is comparable, in today's terms, to that between a realistic digitally synthesized imitation of an existing instrument and a sampled recording of the same instrument. Among over a dozen photoelectric instruments invented in this period, at least three involved sampled sound; these were the Hardy-Goldthwaite organ (New York, circa 1930), Edwin Welte's Lichtton-Orgel (1934-36), whose photoelectric discs were mainly derived from recordings of famous European pipe organs, and the Singing Keyboard (Frederick R. Sammis in Hollywood, c. 1936), in which a short length of film with optical soundtrack was linked to each key,

and played back when that key was depressed. Two further pioneers of photoelectric instruments of the period, Emmerich Spielmann (Austria) in 1931 and Pierre Toulon (France) in the mid-1930s, proposed sampled photoelectric discs, but did not construct such systems, while patents from the period include systems based on film loops by Victor H. Severy and by Clet Bedu and on discs by the Bechstein piano company.

In 1948 at the Paris radio station (RTF) Pierre Schaeffer initiated the activity in *musique concrète* that directly or indirectly influenced nearly all subsequent tape-based composition. For the first three years, however, this was carried out not with tape recorders but with the older disc apparatus. Machinery was available both for recording sounds onto disc and for playing them back. A particular technique devised by Schaeffer was the *sillon fermé* or closed groove, in which -- similar to the later tape loop -- a short sound was recorded in a groove that formed a complete circle rather than spiralling inwards. Schaeffer's diary for 1948 documents the various stages, still influenced by the traditional approach of making music live with musical instruments, that led him to this new medium. They included the idea of an organ based on gramophone turntables (April 1948), even imagining himself, Hollywood style, surrounded by "twelve dozen" turntables. History led him, however, in a different direction. He developed great facility in "performing" the playback and the level adjustments of several (often four) playback turntables in the studio for creating his early sound collages, thus assembling, especially if the discs contained more than one closed groove, a type of sampling machine. In 1951, however, Schaeffer's studio was forced (initially with great reluctance) to replace all their disc machines. Several other composers also created pieces by means of disc manipulations at around the same time (Tristram Cary, London, from 1947, Paul Boisselet, Paris, from 1948, Mauricio Kagel, Buenos Aires and Raymond Chevreuille, Brussels, from 1950), but none of them initiated a sustained and developing activity with the medium in the way the Schaeffer did.

At the end of world War II a new tool had emerged, which was to form the basis for the new era in electronic music: the magnetic tape recorder. Earlier problems of the mechanisms, magnetic recording surface and electrical techniques had been satisfactorily resolved, and the machine was soon marketed with great success. The earliest creative use of this, with less than ideal magnetized paper tape, appears to have been in film scores by the American composer Jack Delano, working in Puerto Rico from 1946. Between around 1948 and 1951 magnetic tape replaced all previous recording systems at European and North American radio stations, such as gramophones and magnetic wire recorders. In the 1960s the first commercially successful sampling instrument, the Mellotron (later, for legal reasons, manufactured as the Novatron), was based -- much like the Singing Keyboard -- on short lengths of magnetic tape, as was its immediate predecessor, the Chamberlin, and its offspring in the mid-1970s, the Biorotron.

Photoelectric systems briefly emerged once again in the early 1970s, with the toy Optigan from Mattel and its derivative the Vako Orchestron. But while a few electromechanical instruments survived during the 1970s, the advent of digital recording, especially by the early 1980s, totally superseded all previous sound-generating systems in cost, capability and efficiency, at least as far as commercial interests were concerned. However, one musician, Jacques Dudon, has developed a series of unusual photoelectric instruments since the mid-1980s that use the principle of the optical siren and are not samplers.

Digital sampling involves the assessment of the waveform of the sound to be recorded in terms of amplitude, sampled in tiny slices at a rate that is normally between 15kHz and 50kHz. Such an analysis is the reverse of digital synthesis (and thus closely related), whereby a sound is assembled from a series of similar tiny slices and smoothed out by a digital-to-analog converter. Since any waveform can be plotted in terms of loudness variations versus time, an analysis or synthesis of its contour, however complex, by means of a string of samples is sufficient to establish its timbre, its frequency and its dynamic level. Because of this reverse relationship between sampling and digital synthesis, it is not too surprising to learn that the designers who set up a new company, Ensoniq, in the mid-1980s, found that the digital synthesis chip they had designed for their first product was also ideal for sampling, so that they decided to start out with the extremely successful sampling keyboard, the Mirage.

In the same period the manufacturers of the two top-end computer-controlled digital synthesizers which were largely based on sampling, the Fairlight CMI and the Synclavier, began to extend the digital storage capacities of the instruments very substantially and to aim their instruments not so much at musicians but at the commercial recording industry as "tapeless studios" -- thus completing the circle of the relationship between recording systems and musical instruments based on the same principles.

During the second half of the 1980s sampling became a common part of every manufacturer's electronic keyboard range, not only in dedicated instruments but also as another means for generating more complex sounds. Today's synthesizers, electronic organs and pianos increasingly feature both synthesized and sampled sounds (or synthesized sounds based on modified samples), which are sometimes kept as separate groups of "stops" and sometimes combined more intimately. Thus, for example, Roland's Linear Arithmetic synthesis (as in the D-50) provides several choices that include mixing synthesized sounds with PCM ones based on samples and the two types ring modulated together, while the sounds of some other recent instruments are created by placing a sampled attack in front of a synthesized body.

In addition to commercially produced instruments a number of one-off instruments and systems based on treatments of prerecorded sounds have

been constructed by musicians for their own performances. Once again the list here only consists of those items that use sampled sounds. Gramophone records were experimented with (especially by means of reversal of playing direction and speed changes) in the 1920s and 1930s by composers such as Darius Milhaud and Edgard Varese, and were the basis of three recorded studies (now unfortunately lost) produced by Paul Hindemith and Ernst Toch in 1929-30. Discs (containing electronic sounds for test purposes) are manipulated by hand in John Cage's *Imaginary Landscape No. 1* (1939), and in the rhythmic "scratching" developed by disc jockeys in the 1970s, which in turn is only one of the wide range of transformation techniques developed by Christian Marclay with his multiple turntables. Walter Ruttmann's *Weekend* (1928) is a sound collage on film soundtrack (with no visuals), while various treatments of sound recordings -- similar to those mentioned with gramophone records, and probably using discs -- were used for film music during the 1930s, especially in France, such as by Ives Baudrier, Arthur Honegger and Maurice Jaubert; in some cases an eerie quality was given to the sound by writing out and recording the music in reverse, then playing the recording backwards. Short lengths of prerecorded tape are the sound source in Laurie Anderson's *Tape Bow Violin*, as well as one of Michel Waisvisz's early instruments. They are also used, stuck down parallel to each other to form a rectangular block and "played back" by a hand-held playback head, constructed for installations and performances by Jon Hassell and in Akio Suzuki's *Lateral Thinking Instrument*. Sophisticated performance controls over commercial digital samplers (sometimes cheap models with limited capabilities) have been developed by Nicolas Collins (*Devil's Music*) and others.

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INSTRUMENTS

STUDENTS' INSTRUMENT IDEAS

Drawings by Dianne Murphy,
Jubal Wilson, Gabrielle Rouse
Jeff Bloom, & Daniel Nasaw
Commentary edited from
notes by Murray Kapell.

All but the last of the drawings on these pages were made by students at Malcolm Shabazz City High School in Madison, Wisconsin. Malcolm Shabazz is an alternative school, serving many students who might otherwise drop out. In the fall of 1988 Murray Kapell and Roan Kaufman taught a music class there called "Music and Listening for Musicians and Non-musicians." The class began with two of weeks of listening exercises. The exercises were deliberately made demanding in a way that was not what the students were used to, and those first weeks trimmed the enrollment from about 25 to the seven students who finished the class. In the following weeks the teachers introduced music from other cultures as well as unfamiliar music styles from the U.S. They also presented the students with music they were familiar with, but approached it in unfamiliar ways. The final part of the course was music making time. Teachers and students worked with different ways of organizing improvised pieces, and with home-made and found instruments. It was also during this part of the course that the instrument designing assignment was given. The students were given copies of EMI to read, and then called upon to dream up something, be it possible or impossible to construct and/or play. Some of the results were the drawings appearing here.

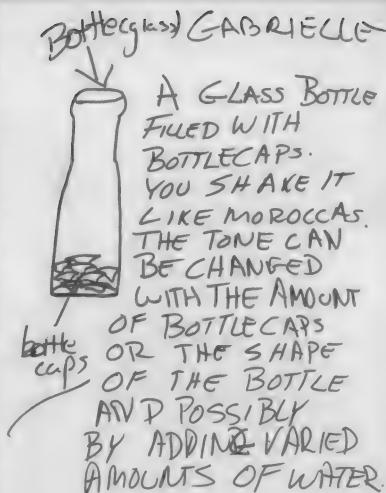
The last of the drawings reproduced here came not from the Kapell-Kaufman music class, but was an independent effort by eight old Daniel Nasaw of New York City. Also included here is Daniel's letter to the patent office.

Jeff's text (at right) reads --

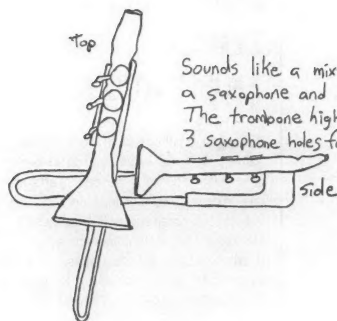
"This is an electrical instrument, that produces high pitched sounds by a spinning blade that cuts slowly through a very hard, very thick piece of plexiglas. The pitch can be varied by speeding or slowing the RPMs of the blade. This is done with the pitch control knob, labeled above.

"It is powered by a standard 12 Volt car battery which is connected to the transformer by jumper cables. The motor spins the blade anywhere from 4000 RPMs to 16,000 RPMs, in exact music intervals.

"Any electrical instrument such as keyboard or guitar can be connected into this sound by plugging it straight into the "hellraiser," any 1/4" jack, RCA stereo jacks, or raw wires can be attached."

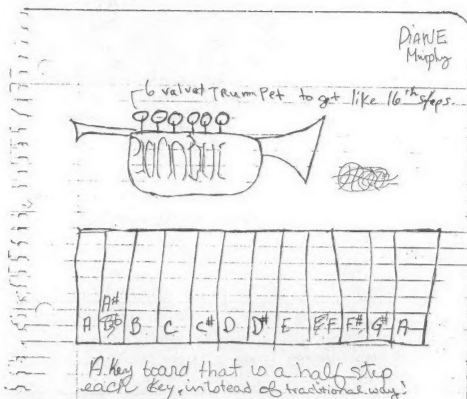


Jubal Wilson



Sounds like a mixture between
a saxophone and a trombone.
The trombone high to low sound with
3 saxophone holes for sound variation.

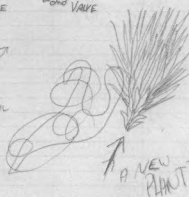
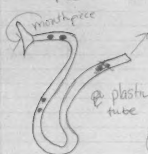
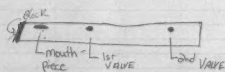
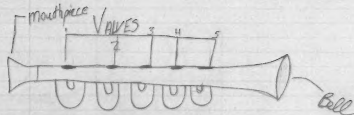
"A keyboard that is a half step each
key, instead of the traditional way!"



DIANE
Murphy

STAY

Like a recorder, but only
plays 1 note.
Have a series of them
to make a song or
tune.



"Like a recorder, but only plays one note!
Have a series of them to make a song or tune."

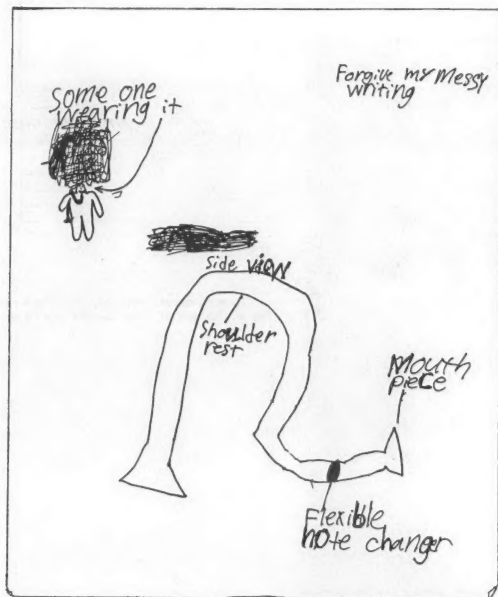
Dear Sir

My name is Daniel Nasaw
I am 8 years old. For the
last 5 years that I have
been alive I have always
thought of making an inven-
tion well now I have.
It is called a ~~mono tuba~~
It is a musical instrument
made out of a house hold
bath room hose but
if you put it on the
market make it out of
metal. On the next
page is a blue print of it

Love Dan

P.S. Please forget my age

Daniel Nasaw's letter to the patent office,
and his blueprint of the mono tuba.



EXPERIMENTAL MUSIC PUBLICATIONS

Balungan. a publication of the American Gamelan Institute. Information on all forms of gamelan, Indonesian performing arts, and related developments worldwide. Subscription (three issues) \$12 individual, \$16 foreign, \$20 institution. Archives Distribution Catalog, listing tapes, monographs, scores, and videos, \$2. Box 9911, Oakland CA 94613. (415) 530-4553.

Frog Peak Music (A Composers' Collective). Publishes and distributes experimental artist-produced books, scores, tapes, and innovative music software. Catalog on request. Box 9911, Oakland CA 94613. (415) 530-4553.

Musicworks: The Canadian Journal of Sound Explorations. Journalistic and audio perspectives on all aspects of music and music-making. Subscription (3 issues annually) \$26, includes cassettes. Sample issue (28 pages) with 60 min. cassette, \$8.75. 1087 Queen St. West, Toronto, Canada M6J 1H3. (416) 945-4458

1/1: The Quarterly Journal of the Just Intonation Network. David B. Doty, editor. Serves composers, musicians, instrument designers and theorists working with tunings in Just Intonation. One year membership includes subscription. Individual, \$15 US, \$17.50 foreign; institution \$25. 535 Stevenson St. San Francisco CA 94103. (415) 864-8123.

Experimental Musical Instruments. Bimonthly newsletter and yearly cassette documenting new acoustic and electroacoustic sound sources. Subscription \$20/year, tapes \$8.50 general, \$6 to subscribers. Sample issue on request. PO Box 784, Nicasio CA 94946.

Soundings Press. Since 1972 Soundings Press has published an annual anthology of scores and articles by today's young composers, and composers active earlier in the century: Nancarrow, Harrison, Bowles, Cowell, Partch, Revueltas. The radical edge of contemporary American music. Free 16-page catalog upon request. PO Box 8319, Santa Fe NM 87504.

Following below are selected articles of potential interest to readers of *Experimental Musical Instruments* that have appeared recently in other publications. PLEASE NOTE -- Due to a shortage of space, this issue's listing has been truncated; we'll include the remaining listings next time around.

MAKING SENSE OF PIEZO PICKUPS by William Campiano, in *The String Instrument Craftsman*, Volume 2 #9, May/June 1989 (20085 Stevens Creek Blvd., Cupertino, CA 95014).

A practical overview of piezo pickups, with an emphasis on their use on acoustic guitars; also included is a quick review of alternative sorts of electro-acoustic transducers. This is a short but useful article on a subject that EMI readers have often asked about.

DEVELOPMENT OF A 53-TONE KEYBOARD LAYOUT by Larry Hanson, in *Xenharmonikon XIII*, Spring 1989 (6881 Sherwood Dr., Berkeley, CA 94705).

Diagrams and documentation for keyboard layouts designed for a just scale of 53 tones per octave.

SUPPLEMENT: INSTRUMENT MAKERS, ETC., PART I, also in *Xenharmonikon XIII* (address above).

A short listing of instrument makers specializing in scales other than 12-tone equal temperament, including makers and tuners of free reeds for harmoniums and such.

METAL TUBES AND BARS by Ivor Darreg, in *Xenharmonikon Bulletin* Number 11, Spring 1989 (3612 Polk Ave., San Diego, CA 92104).

After a layoff of seven years, Ivor Darreg's *Xenharmonikon Bulletin* is back. The tubes and bars article highlighted here is a practical discussion of the use of metal sounding bars in marimba-style instruments designed for unconventional tunings. In the same issue is a discussion of the characteristics of 41, 43 and 46 tone equal temperaments, and the use of electronic devices in tuning for non-standard scale systems.

STRING LAYOUT AND TONALITY: A MATHEMATICAL TOOL by Robert Cunningham, in *Folk Harp Journal* Vol. 65, Summer 1989 (4718 Maychelle Drive, Anaheim, CA 92807-3040).

A guide for string scaling (finding the optimal relationship of string length, tension and gauge for the intended pitch), which takes as its starting point that the most important relationship will be the ratio of tension to tensile strength for the string material used.

HARPMAKER'S NOTEBOOK #10 -- REAL STRINGS by Mark Emery Bolles, also in *Folk Harp Journal* Vol. 65, Summer 1989 (address above).

The first of a series of articles on vibrating string behavior. An excellent presentation of technical information in a form accessible to

everyone. As it happens, EMI will be publishing a review of strings & string behavior starting in the next issue; ours will have a very different approach and emphasis from the Mark Bolles article cited here, and for that reason we may make the series of Bolles articles required complementary reading as they appear more or less concurrently in coming issues of FHJ.

ON MEASURING THE ELASTIC AND DAMPING CONSTANTS OF ORTHOTROPIC SHEET MATERIALS, by M.E. McIntyre and J. Wodehouse, in *Acta Metallurgica*, Vol. 36 #6, 1988.

Analysis of vibrating behaviors of several different sheet materials, including plywood, fiberglass reinforced circuit board, carbon fiber sandwich, quarter sawn spruce, and spruce cut at 40 degrees to radial.

MARTIN INTRODUCES ACOUSTIC BASS, in *The Music Trades* Vol. 137 #5, June 1989 (80 West St., PO Box 432, Englewood, NJ 07631).

A short description of two new models of acoustic bass guitars recently unveiled by the Martin Guitar Company. The instruments are very guitar-like, actually using the same bodies as large Martin guitars.

Several noteworthy articles appeared in *American Lutherie* Number 17, Spring 1989 (8222 South Park Ave., Tacoma, WA 98408). Among them:

AN INTRODUCTION TO THE STRADIVARIAN MYSTIQUE by Tim Olsen looks at many aspects of Stradivarius, legend and reality. In addition to biography of the man and description of the instruments, Olsen looks at the market for surviving instruments, modern attempts to assess what went into the making of the instruments, modern methods for analyzing violin performance, and the ways in which the original instruments have been rebuilt and modified over the years.

BUILDING THE PRIMA BALALAIKA by Jim Flynn contains instructions and plans for building a Russian Balalaika.

IN DEFENSE OF SHORT SCALE BASSES by Michael Sacek describes the creation of short scale (31") string basses, both guitar-like and fiddle-like, from one who has built several such.

Ear Magazine Vol. 14 #14, June 1989 (325 Spring St. Room 208, New York, NY 10013) focuses on violins in new music. Among the features:

JON ROSE: THE RELATIVE VIOLIN, by Charles Russell, describes Jon Rose's outrageous way with violins & his peculiar violin-based constructions.

KEN BUTLER: IT DON'T MEAN A THING IF IT AIN'T GOT THAT SWING, by Iris Brooks (photographs by David Barry), has a short text accompanied by a liberal handful of photos of some of the more violin-like of Ken Butler's creations -- a knife, an axe, a hammer, some tennis rackets, all strung up, supplied with transducers, and awaiting the bow.